

AMENDMENTS TO THE DRAWINGS:

The attached annotated sheets of drawings include changes to Figures 1, 5, 6 and 8. These annotated sheets, which include Figures 1, 5, 6 and 8, respectively, replace the original sheets including the same figures. In Figures 1 and 6, the reference numbers "19" and "21" and associated lead lines are added. In Figures 5 and 8, the reference number "19" and associated lead lines are added. Replacement sheets including the changes to Figures 1, 5, 6 and 8, as well as the remaining Figures, are also attached.

Attachments: Replacement Sheets (8)

Annotated Sheets Showing Changes (4)

AMENDMENTS TO THE DRAWINGS:

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Attachments: Replacement Sheets (4)

Annotated Sheets Showing Changes (4)

REMARKS

By this reply, Claim 26 has been rewritten in independent form to include the combined features of Claims 1 and 26. Claims 1-30 are pending in the application. Claims 22-25 stand withdrawn from consideration. The amendment to Claim 26 (a) does not raise the issue of new matter; (b) does not raise any new issue that would require further search and/or consideration; and (c) places the application in better condition for appeal. Therefore, the amendment to Claim 26 should be entered. Reconsideration and allowance are respectfully requested in view of the following remarks.

Allowable Subject Matter

Applicants gratefully acknowledge the indication in the Official Action that Claim 26 contains allowable subject matter. Accordingly, Claim 26, as amended, is allowable.

Objections to Drawings

The Official Action objects to the drawings under 37 C.F.R. § 1.83(a) for the reasons stated at numbered point (4) on pages 2-3 of the final Official Action. The Official Action states that the following features recited in the claims must be shown in the drawings: "first member," "second member," "first part," "second part," "third part," "first surface" and "second surface." For the reasons stated in the Amendment filed on August 15, 2005, Applicants submit that exemplary embodiments of each of these claimed features is shown in the original drawings.

In order to expedite prosecution, however, Applicants propose to amend Figures 1, 5, 6 and 8 as shown in the attached annotated and replacement drawing sheets. As shown, in each of Figures 1 and 6, the reference numbers "19" and "21" and associated lead lines have been added, and in each of Figures 5 and 8, the reference number "19" and associated lead lines have been added.

The specification has been amended based on the drawing changes. More particularly, paragraph [0021] of the specification has been amended to describe the "bottom surface 19" (or "first surface") and the "top surface 21" (or "second surface") of the backing plate 18 depicted in Figures 1 and 6. As shown in Figure 1, the bottom surface 19 of the backing plate 18 is bonded to the top surface 16 (or attachment surface) of the inner electrode member 12. In the illustrated embodiment, the upper showerhead electrode comprises the inner electrode member 12 and outer electrode member 14. The inner electrode member 12 is also described in the present application as a "second member" (see, e.g., Claim 7) and a "first part" (see, e.g., Claim 12).

Paragraph [0024] of the specification has been amended to indicate that the backing plate 18 is also described in the present application as a "first member" (see, e.g., Claim 7) and as a "second part" (see, e.g., Claim 12); and the backing plate 18 and backing ring 22 are also described as comprising a "first member" (see, e.g., Claim 8).

Paragraph [0025] of the specification has been amended to indicate that the top plate 24 is also described in the present application as a "third part" (see, e.g., Claim 28).

Applicants submit that the amended drawings show each of the recited "first member," "second member," "first part," "second part," "first surface" and "second surface," and thus the drawings satisfy the requirements of 37 C.F.R. § 1.83(a). Therefore, withdrawal of the objections to the drawings is respectfully requested.

Rejections Under 35 U.S.C. §112, First Paragraph

Claims 10-16 stand rejected under 35 U.S.C. § 112, first paragraph, for the reasons stated at numbered points (6)-(8) on pages 4-5 of the final Official Action.

The Official Action states that the "first surface" and "second surface" recited in Claim 10 are not described in the specification. As discussed above, the specification has been amended to describe the first and second surfaces and the drawings have been amended to indicate the locations of these surfaces.

The Official further Action states that the "third part" recited in Claim 11 is not described in the specification. As discussed above, the specification has been amended to describe the "third part."

As was discussed in the Amendment filed on August 15, 2005, the original claims constitute their own written description. Accordingly, the amendments to the specification do not introduce new matter.

Withdrawal of the rejections is respectfully requested..

Rejection Under 35 U.S.C. § 103

Claims 1-21 and 27-30 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,818,096 to Barnes et al. ("Barnes") in view of U.S. Patent No.

5,766,344 to Ishida et al. ("Ishida") for the reasons stated at numbered point (10) on pages 1-13 of the final Official Action. The rejection is respectfully traversed.

Claim 1 recites a component of a plasma processing apparatus, which comprises "a first member bonded to a second member, the first member including a plurality of through apertures having a first portion and a second portion wider than the first portion; and a plurality of first fastener members each mounted in an aperture of the first member, each first fastener member including a head configured to prevent rotation of the first fastener members relative to the first member, the head having a bearing surface facing a surface that at least partially defines the second portion of the aperture" (emphasis added).

Referring to Figure 3, an exemplary embodiment of a fastener member 38 ("first fastener member") mounted in an aperture of a backing ring 22 ("first member") bonded to an outer electrode member 14 ("second member") is shown. Top plate 24 is adjacent the backing ring 22. As shown, the top plate 24 is a separate part of the component. A fastener member 28 ("second fastener member") engages the fastener member 38. The fastener member 38 has a head configured to prevent rotation of the fastener member 38 relative to the backing ring 22. For example, the fastener member 38 can have a T-nut configuration as shown in Figure 4. The head 40 of the T-nut-shaped fastener member 38 has a generally rectangular shape, which prevents rotation of the fastener member 38 relative to the backing ring 22 when the fastening member 38 is placed in an aperture 36 of the backing ring 22.

Referring to Figure 1 of Barnes, the Official Action states that Barnes discloses a component comprising a "first member" 7 (i.e., the lid 7) bonded to a "second member" 1, 8 (i.e., upper plate 1 and outer ring 8) and including a plurality of

through apertures, "T-shaped hole for 22" (i.e., the attachment bolt 22), and a plurality of "first fastener members (members between 7 and 22)" each mounted in an aperture.

During the January 26, 2006, telephone conference between the Examiner and the undersigned, the Examiner stated that in the electrode structure shown in Figure 1 of Barnes, the "first fastener members" are the dark-shaded elements identified by reference number 22, which Barnes describes as attachment bolts 22. The Examiner also stated during the interview that the light-colored elements inside of the attachment bolt 22 are not considered as part of the "first fastener members" of Barnes' electrode structure. Applicants have attached a marked-up copy of Figure 1 of Barnes showing the location of a "first fastener member" according to the Examiner's interpretation of Barnes. For the following reasons, Applicants submit that Barnes does not disclose or suggest the component recited in Claim 1.

Figure 1 of Barnes is a cross-sectional view of the plasma reactor electrode structure. As such, Figure 1 does not show the actual shape of the attachment bolt 22 (the alleged "first fastener member"). Figure 1 also does not show that the attachment bolt 22 includes a "head" configured to prevent rotation of the attachment bolt 22 relative to the lid 7. Furthermore, Barnes includes no description regarding the shape of the hole or the "head" of the attachment bolt 22. Accordingly, the Official Action has not established that Barnes' electrode structure includes, *inter alia*, the features of "a plurality of first fastener members each mounted in an aperture of the first member, each first fastener member including a head configured to prevent rotation of the first fastener members relative to the first member, the

head having a bearing surface facing a surface that at least partially defines the second portion of the aperture” (emphasis added), as recited in Claim 1.

Applicants submit that Ishida does not provide the required suggestion or motivation to modify Barnes’ electrode structure to produce the component recited in Claim 1 including, *inter alia*, the features of a first member and a plurality of first fastener members each mounted in an aperture of the first member. Although the Official Action asserts that Barnes’ electrode structure includes the first fastener members recited in Claim 1, the Official Action also asserts that it would have been obvious to add Ishida’s “first fastener members” (i.e., the heat conductor 109) to Barnes’ apparatus. The Official Action asserts that Ishida’s “first fastener members” 109 (i.e., heat conductors 109) are “bonded” with an elastomer (i.e., O-rings 31a shown in Figure 3). Applicants respectfully disagree with these assertions.

As shown in Figure 2 of Ishida, the heat conductor 109 is in the form of a plate or grid having rectangular spaces 109a disposed between the frame 109b and crossing bars 109c. Thread holes 33a are formed in the crossing bars 109c. O-rings are placed in the thread holes 33a. First bolts 30a are received in the thread holes 33a to attach the temperature controlling plate 106 to the heat conductor 109. Figure 3 of Ishida shows a cross-section through the heat conductor 109 at the location of a thread hole 33a. The portion of the heat conductor 109 shown in Figure 3 of Ishida is part of the plate structure, i.e., it is integral with the remainder of the heat conductor depicted in Figure 2.

Applicants submit that Ishida provides no suggestion to modify Barnes’ electrode structure to add Ishida’s heat conductor 109. As discussed above, Ishida’s heat conductor 109 is a single-piece plate structure. In contrast, Barnes’ attachment

bolts 22 are shown as inserts in holes formed in the lid 7. The Official Action has not stated how Barnes' electrode structure would be modified to add Ishida's heat conductor 109, i.e., exactly where in Barnes' electrode structure Ishida's heat conductor 109 would be added. Claim 1 recites "a plurality of first fastener members each mounted in an aperture of the first member." Ishida's heat conductor 109 does not include a plurality of first fastener members, each of which is mounted in a respective aperture of a first member. The portion of the first conductor 109 shown in Figure 3 of Ishida is not mounted in aperture of a first member, but is surrounded by gas pressure equalizing space 109. As such, even if Barnes' electrode structure were modified by adding Ishida's heat conductor 109, the resulting structure still would not include at least the features of "a plurality of first fastener members each mounted in an aperture of the first member, each first fastener member including a head configured to prevent rotation of the first fastener members relative to the first member," as recited in Claim 1.

Furthermore, the Official Action acknowledges that Barnes does not disclose that the "first member" 7 is bonded to the "second member" 1, 8, as recited in Claim 1. The Official Action provides no reasons as to why it would have been obvious, in view of the applied combination of references, to modify Barnes' electrode structure to bond the lid 7 ("first member") to the upper plate 1 and outer ring 8 ("second member"). Absent any motivation for modifying Barnes' electrode structure to result in the component recited in Claim 1, including, *inter alia*, the features of "a first member bonded to a second member, the first member including a plurality of through apertures having a first portion and a second portion wider than the first

portion,” (emphasis added), the component recited in Claim 1 is patentable over the applied combination of references for this additional reason.

Dependent Claims 2-9 are also patentable over the combination of Barnes and Ishida for at least the same reasons as those discussed above with respect to Claim 1. Moreover, these dependent claims recite additional combinations of features that are neither disclosed nor suggested by the applied combination of references. For example, Claim 2 recites that “the first fastener members are T-nuts with internal threads.” As discussed above, the Examiner considers the attachment bolt 22 to be a “first fastener member,” as recited in Claim 1. Figure 1 does not show the shape of the attachment bolt 22, let alone show that the attachment bolt 22 is a T-nut with internal threads.

As another example, Claim 3 recites that “the surface that at least partially defines the second portion of the aperture is a second bearing surface and the bearing surface of each of the first fastener members is bonded with an elastomer to the second bearing surface.” The Official Action asserts that Ishida discloses “first fastener members” 109 (i.e., heat conductors 109) “bonded” with an “elastomer” 31a (i.e., O-ring 31a). Applicants submit that Ishida's heat conductor 109 is not bonded to the temperature controlling plate 106 by the O-rings 31a. Rather, the O-rings 31a form a seal between the plate 106 and heat conductor 109 when these plates are fastened to each other. The O-rings 31a do not bond the plate 106 and heat conductor 109 together; rather, these elements are held together by the fasteners. As such, the heat conductor 109 is adhesively bonded with an elastomer to a second bearing surface of an aperture, as recited in Claim 3. Thus, Ishida provides no

suggestion or motivation to modify Barnes to result in the component recited in Claim 3 for these additional reasons.

Claim 4, as amended, recites “a temperature-controlled top plate adjacent the first portion of the apertures of the first member and including a plurality of through openings each aligned with a respective aperture in the first member; and a plurality of second fastener members each engaged with a respective first fastener member to secure the first member to the top plate” (emphasis added). As recited in Claim 1 from which Claim 4 depends, the second portions of the apertures are wider than the first portions. In the exemplary embodiment of the claimed component shown in Figure 3, the top plate 24 is adjacent the narrow portion of the aperture 36.

At page 6, point (ii), the Official Action asserts that Barnes discloses a temperature-controlled “top plate” 7. However, as discussed above, the Official Action also asserts that Barnes’ lid 7 is a “first member.” As such, the Official Action asserts that the lid 7 is both a “first member” and temperature-controlled “top plate.” However, the component recited in Claim 4 patentably distinguishes over the combination of Barnes and Ishida despite this inconsistent interpretation of Barnes. Claim 4 recites that the temperature-controlled top plate is adjacent the first member. As such, the top plate is a separate part of the component from the first member. To the extent that Barnes’ lid 7 has been asserted to be a “first member,” as claimed, then Barnes does not also disclose the recited “temperature-controlled top plate” adjacent the lid 7.

Claim 6 recites the features of “each of the first fastener members includes a non-circular shaped head” (emphasis added). As discussed above, Barnes does not disclose or suggest a plurality of “first fastening members” having a non-circular

shaped head configured to prevent rotation of the first fastener member relative to the first member. Ishida fails to cure the deficiencies of Barnes.

Claims 10-16 are also patentable over the applied references. Independent Claim 10 recites “a first part including an attachment surface and an exposed surface adapted to be exposed to an interior of a plasma processing chamber; a second part including a first surface spaced from a second surface, the first surface being bonded to the attachment surface of the first part, the second part including axially extending apertures extending between the first surface and the second surface, each of the apertures including a first portion opening in the first surface and a second portion opening in the second surface, the first portion being wider in a transverse direction than the second portion” (emphasis added).

In an exemplary embodiment, the first part can be a showerhead electrode and the second part can be a backing plate, as recited in Claim 12. As shown in Figures 1 and 6, the backing plate has a bottom surface (or “first surface”) 19 and a top surface (or “second surface”) 21. The bottom surface 19 is bonded to the top surface (or “attachment surface”) 16 of the electrode member (or “first part”) 12. Figure 3 shows a portion 13 of the electrode attached to a portion 22 of the backing plate. As shown, an aperture 36 is formed in the portion 22 of the backing plate. A fastener member 38 is located in the wider “second portion” of the aperture 36, which opens at the bottom surface (or “second surface”) of the portion 22 of the backing plate.

Although Claims 10-16 are included in this ground of rejection, the Official Action provides no reasons in support of the rejection of these claims, but states that “[t]he Examiner cannot make an accurate art-based rejection without claims 10-16

being properly supported by Applicant's specification." As discussed above, however, Applicants have amended the drawings and specification to fully address each of the Examiner's contentions set forth in the rejection under 35 U.S.C. § 112, first paragraph. Accordingly, Applicants respectfully request a proper art-based analysis of Claims 10-16 be made by the Examiner.

The combination of Barnes and Ishida does not suggest the component recited in Claim 10 for at least the following reasons. Barnes' structure does not include a second part including apertures having a first portion and a wider second portion opening at a first surface of the second part, where the first surface is bonded to an attachment surface of a first part, as recited in Claim 10. For example, Barnes' lid 7 is the top portion of the electrode structure. In Barnes' lid 7, the wider part of the hole in which the attachment bolt is disposed opens at the top surface of the lid 7. There is no "first part" overlying the top surface of the lid 7 in Barnes' electrode structure. Ishida does not suggest modifying Barnes' electrode structure to result in the component recited in Claim 10. Accordingly, the component recited in Claim 10 is patentable over the applied combination of references.

Dependent Claims 11-16 are also patentable over the applied combination of references for at least the same reasons as those for Claim 10. Moreover, these dependent claims recite additional combinations of features that are not suggested by the applied references. For example, Claim 12 recites that the first part is a showerhead electrode. As discussed above, there is no first part overlying Barnes' lid 7 (in which the wider portion of the hole in which the attachment bolt 22 is located opens at the top surface of the lid 7), much less a showerhead electrode. Clearly,

the combination of Barnes and Ishida does not suggest modifying Barnes' electrode structure by placing a showerhead electrode on top of the lid 7.

As another example, Claim 15 recites that the fastener members are T-nuts. As discussed above, neither Barnes nor Ishida suggests T-nuts.

Independent Claim 17 recites a showerhead electrode assembly for a plasma processing apparatus, which comprises "a silicon electrode having gas injection openings; a graphite backing member secured to the silicon electrode, the backing member including a plurality of through apertures each having a first portion and a second portion wider than the first portion; a top plate including a plurality of through openings each of which is aligned with a respective aperture in the backing member; a plurality of first fastener members, each first fastener member being mounted in a respective aperture of the backing member, the first fastener member including a bearing surface facing a surface at least partially defining the second portion of the apertures; and a second fastener member engaged with each first fastener member to secure the backing member to the top plate" (emphasis added). The applied references fail to suggest the showerhead electrode assembly recited in Claim 17.

The claimed showerhead electrode assembly comprises a silicon electrode having gas injection openings. For example, the embodiment of the claimed assembly shown in FIG. 1 includes an inner electrode member 12 including a plurality of gas injection openings adapted to inject process gas into a plasma processing chamber.

The Official Action asserts that Barnes discloses an "electrode" 7 (i.e., lid 7) and a "top plate" 7 (i.e., lid 7); i.e., that the same lid 7 is both a top plate and an electrode. Applicants submit that the component recited in Claim 17 patentably

distinguishes over the combination of Barnes and Ishida despite this inconsistent interpretation of Barnes. Particularly, Claim 17 recites that the backing member is secured to (i) the silicon electrode and (ii) the top plate; i.e., the silicon electrode and top plate are separate parts of the assembly. Thus, to the extent that Barnes' lid 7 has been considered to be an "electrode," Barnes' apparatus does not also include a "top plate," as claimed. Moreover, Barnes's lid 7 does not include gas injection openings, as does the silicon electrode recited in Claim 17. The combination of Barnes and Ishida does not suggest modifying Barnes' electrode structure to replace the lid 7, which provides cooling of the electrode structure, with a silicon electrode having gas injection openings and which provides an entirely different function than the lid 7.

Barnes also does not suggest "a graphite backing member secured to the silicon electrode, the backing member including a plurality of through apertures each having a first portion and a second portion wider than the first portion" (emphasis added), as recited in Claim 17. To the extent that Barnes' upper plate 1 has been considered to be a "backing member," Barnes does not disclose that the upper plate 1 includes "a plurality of through apertures each having a first portion and a second portion wider than the first portion," as recited in Claim 17.

For at least the foregoing reasons, the combination of Barnes and Ishida does not suggest the showerhead electrode assembly recited in Claim 17. Thus, the assembly recited in Claim 17 is patentable over the applied references.

Dependent Claims 18-21 are also patentable over the applied references for at least the same reasons as those discussed with respect to Claim 17. Moreover, these dependent claims recite additional combinations of features that are not

suggested by the applied references. For example, Claim 19 recites the features of "the second portion of each aperture [of the graphite backing plate] is configured to prevent rotation of the first fastener member relative to the backing member." For reasons discussed above, neither Barnes nor Ishida suggests such apertures.

Claim 20 includes the features of "the silicon electrode comprises an inner member and a segmented outer member, and the backing member comprises a backing plate secured to the inner member and a backing ring secured to the outer member" (emphasis added). In contrast, neither Barnes nor Ishida suggests such a multi-piece silicon electrode secured to a multi-piece backing member.

Therefore, withdrawal of the rejection is respectfully requested.

Conclusion

For the foregoing reasons, allowance of the application is respectfully requested. If there are any questions concerning this response, the Examiner is respectfully requested to contact the undersigned at the number given below.

Respectfully submitted,

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Date: January 30, 2006

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"first fastener member"
not part of
first fastener member

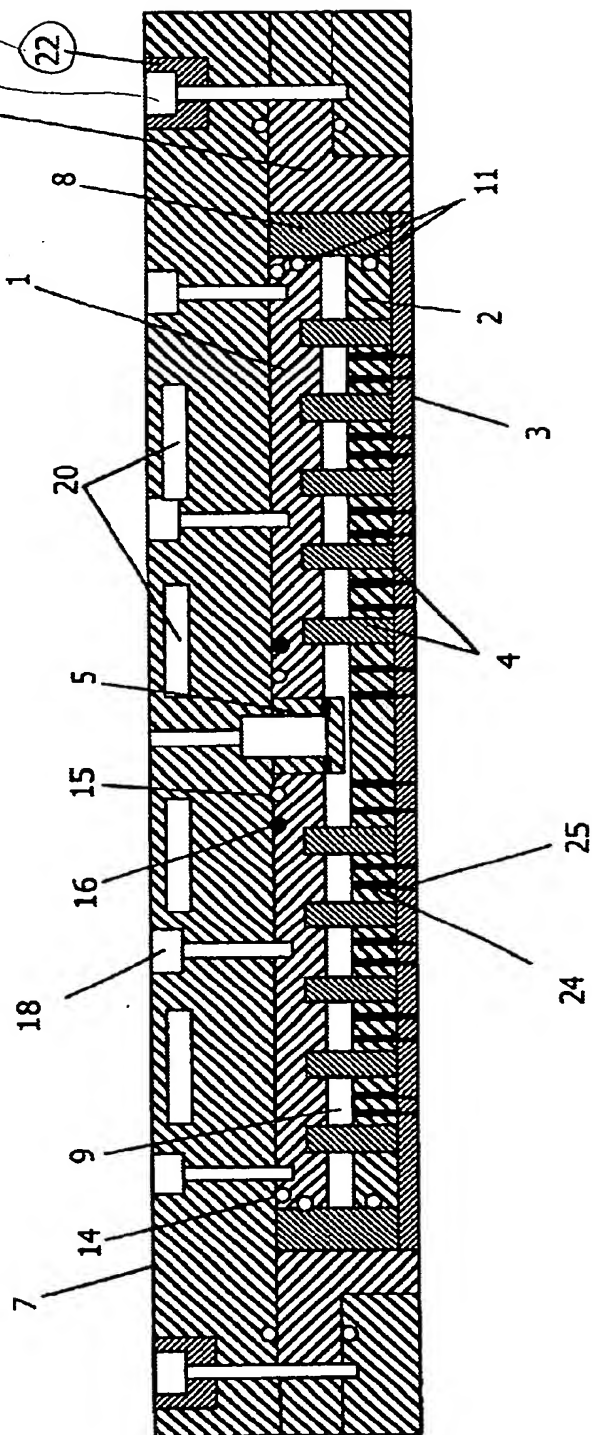


FIG. 1

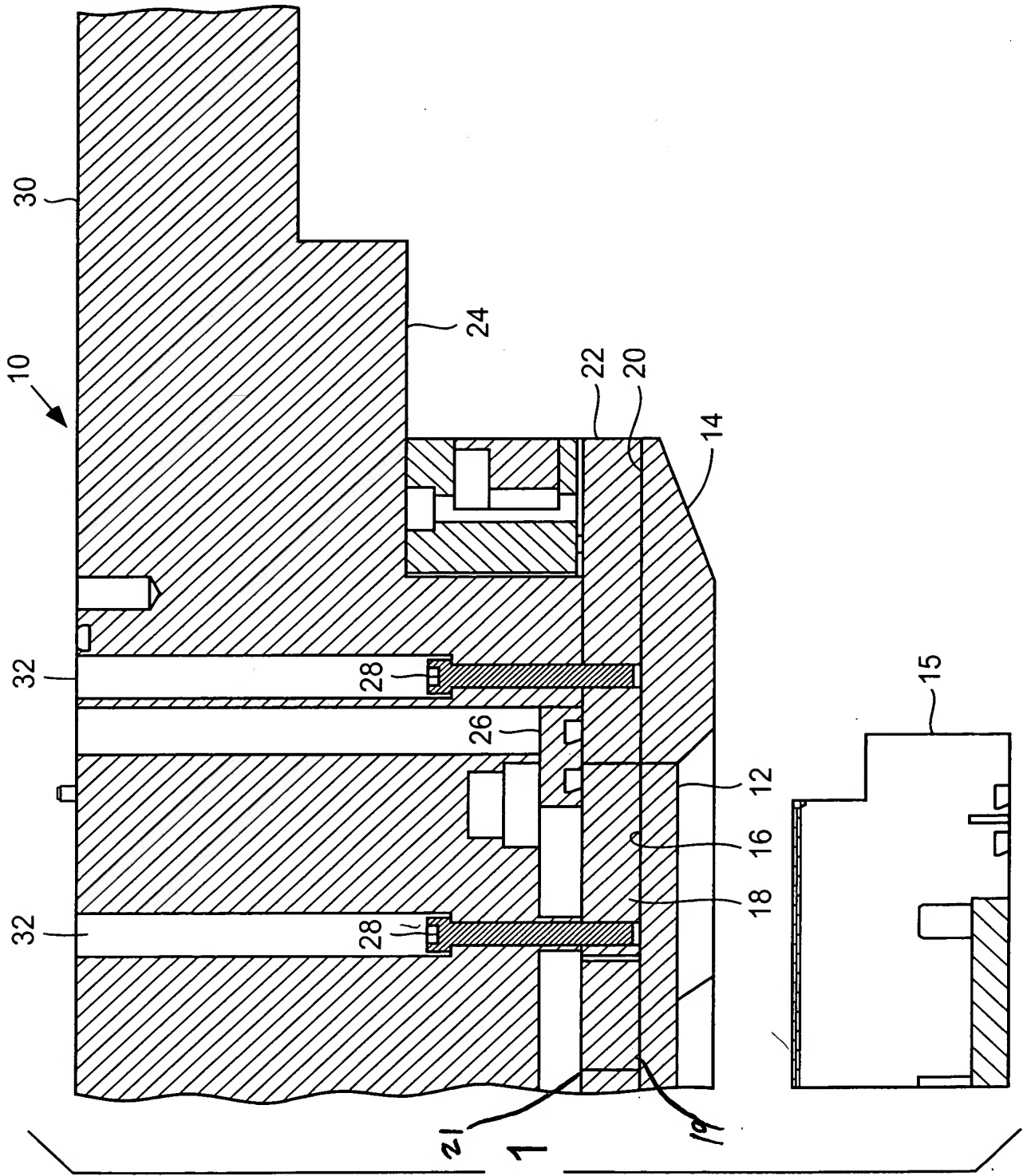


FIG. 1

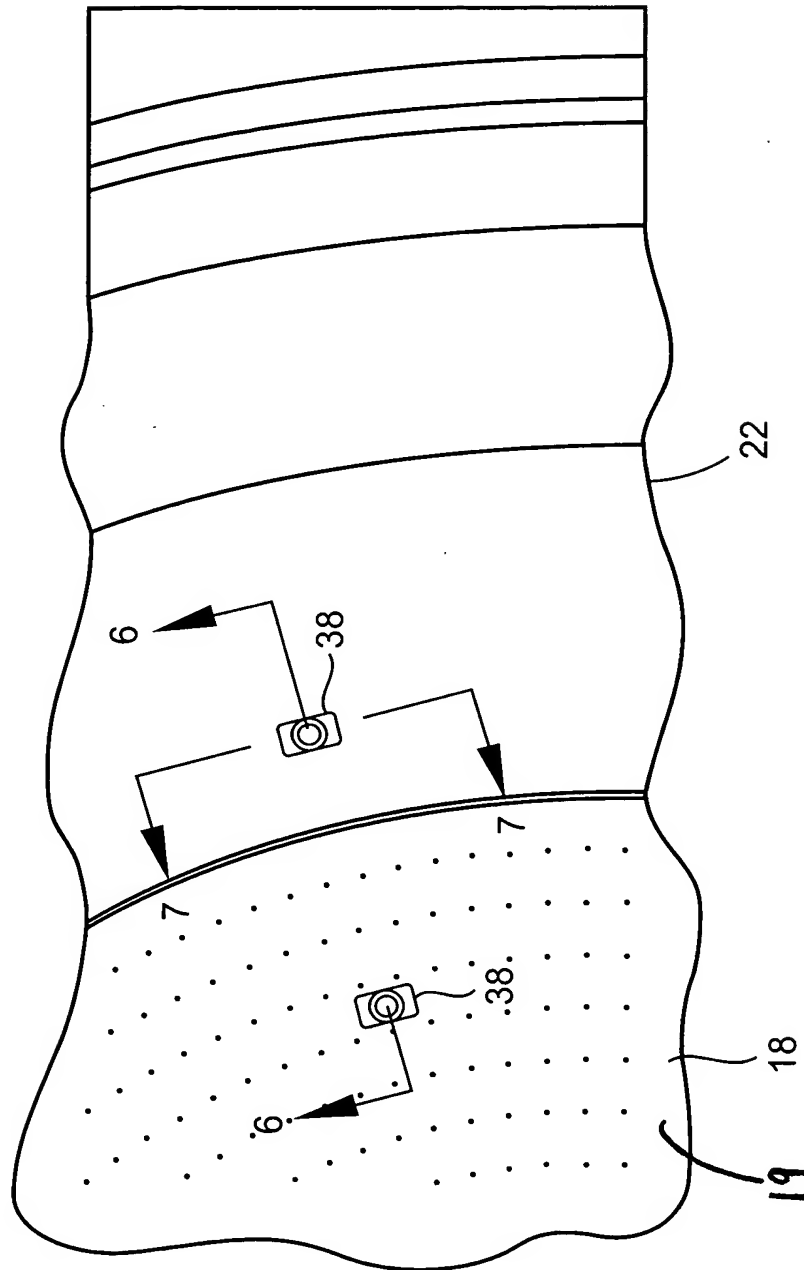


FIG. 5

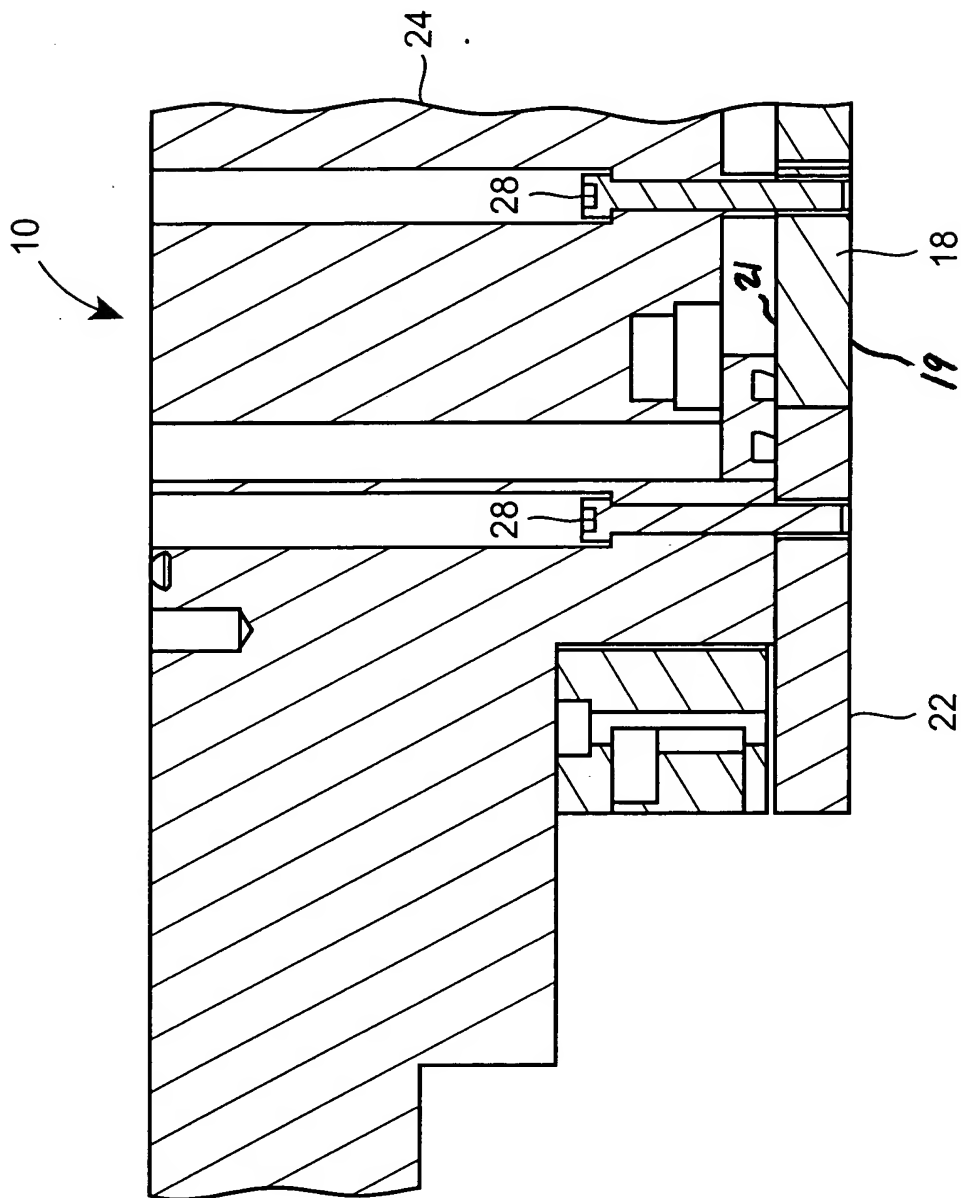


FIG. 6

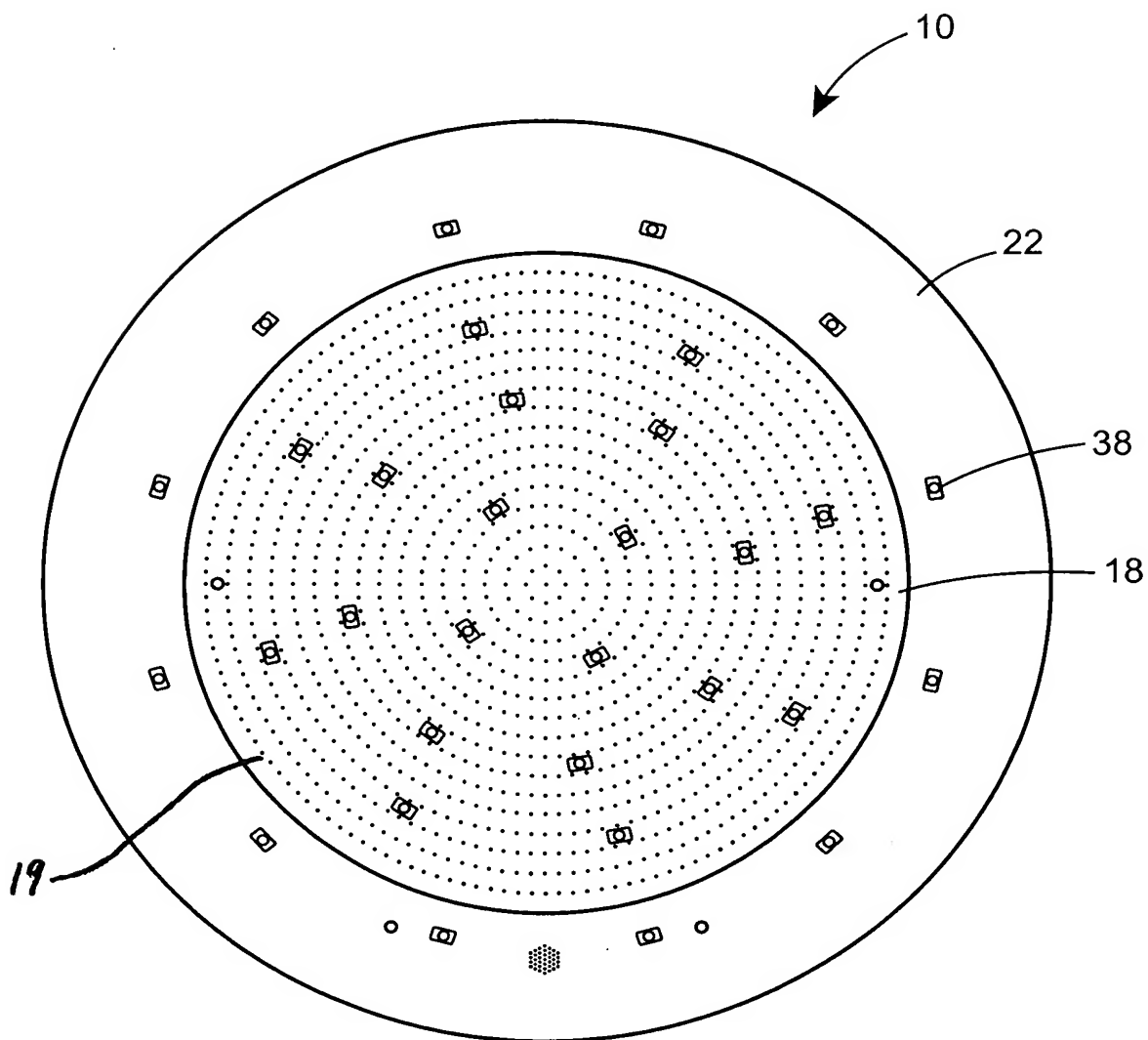


FIG. 8